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USE OF SCIENTIFIC AND TECHNICAL
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ORGANIZATIONAL STRUCTURE AND OPERATION OF DEFENSE/AEROSPACE INFORMATION CENTERS IN THE UNITED STATES OF AMERICA

by

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SUMMARY

This paper, prepared jointly by the Defense Technical Information Center (DTIC) and the National Aeronautics and Space Administration (NASA), addresses U.S. Government aerospace and defense information centers. Discrete sections of the paper describe DTIC and NASA in terms of their history, operational authority, information services provided, user community, sources of information collected, efforts under way to improve services, and external agreements regarding the exchange of documents and/or data bases. Contents show how DTIC and NASA provide aerospace/defense information services in support of U.S. research and development efforts. In a general introduction, the importance of scientific and technical information and the need for information centers to acquire, handle, and disseminate it are stressed. The paper concludes with observations that have been drawn from U.S. experience in operating these centers.

INTRODUCTION

During the late 1950s and early 1960s, the United States became increasingly concerned with the vital role played by science and technology, not only in the nation's economy and welfare, but also in national security. A subcommittee of the Senate Committee on Government Operations conducted a long, interrelated series of studies and hearings dealing with the management of scientific and technical information (STI). In 1961, they reported "precipitous R and D growth" but "no complete inventory . . . of the Federal Government's program in research and development" The late Hubert H. Humphrey, then a U.S. Senator and Chairman of the Subcommittee on Reorganization and International Organizations, opened the 1961 report with a straightforward statement that included the following:

The initial aim of research and development is to generate helpful information. If good scientific work is done, but information does not flow promptly about it and from it, much of its value may be dissipated.

Information is the crucial means to the end. The goal is progress in military and civilian scientific technology. The means is the circulation of facts about how this goal is being approached. Throughout the process, the management of information may crucially affect how fast and how well successive aims are reached.¹

Mr. Humphrey played a major part in convincing federal agencies to institute STI programs to avoid overlap and duplication of federal research and development (R&D) programs.

In 1963, the President's Science Advisory Committee observed that communication is an essential part of research; if an agency sponsors research in support of the agency mission, it ought also to allocate resources to support the communication necessary for effective conduct of that research.² In 1965, a report produced for the Committee on Scientific and Technical Information (COSATI) restated this principle as follows: "the development of scientific knowledge depends on the communication of new theories and new experimental observations to others."³ To accept this point of view was (and is) to recognize the essentiality of effective information management in S&T progress and in the efficient use of R&D resources.

During 1963 and 1964, the Department of Defense (DoD) and NASA made important advances in STI management. In 1965, the Committee on Government Operations reported gains by "the Federal Government's largest program of science and technology information" and cited cooperation between DoD and NASA as "the most important bilateral information effort in the Federal Government today."⁴

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The 1965 report generated from a COSATI study of national S&T document handling systems analyzed plans and proposals that preceded it.³ According to that report, the S&T information and documentation problem had several components.

S&T INFORMATION/DOCUMENTATION PROBLEMS (1965 COSATI REPORT FINDINGS)

- O Increasing numbers of users and user requirements.
- O Increasing numbers of documents/information.
- O Difficulties in the existing system (which consisted of many independent units)
- O Non-application of new technologies.
- O Insufficient long-range planning.

The study recognized "a need for the development of national policy regarding S&T information and documentation problems," arrived at the assumption that "information centers are a permanent part of any national system(s) for handling scientific and technical information," and recommended "a national document-handling system in science and technology."

More recently, government budget restraints have prompted studies aimed at quantifying the value of information services. One such study was done by King Research, Inc., and involved an analysis of Department of Energy (DoE) data base products and services.⁵ The study calculated that \$2.8 billion of savings could be attributed to the existence of the DoE products and services. Based upon DoE's R&D budget for FY 1981, that research savings amounts to about a 68 percent increase in productivity. Studies like this indicate that money appropriated for technical information services has a large return.

PART A

DEFENSE TECHNICAL INFORMATION CENTER

I. HISTORY

The Defense Technical Information Center (DTIC) was established to support Defense-related research, development, test, and evaluation (RDT&E) activities. Its history can be traced back to 1945 when captured technical documents were acquired by the Air Documents Division of the Air Materiel Command Intelligence Department. Two years later the Central Air Documents Office was formed.

In 1951, Secretary of Defense George C. Marshall combined Air Force and Navy efforts to establish the Armed Services Technical Information Agency (ASTIA) to serve all three military departments and their contractors. By 1963 there were 700,000 titles in ASTIA's collection (with more than one million annual requests for documents); at that time, operational control for ASTIA was transferred to the Defense Logistics Agency (DLA) under the policy guidance of the Office of the Director of Defense Research and Engineering (ODDR&E); and ASTIA became the Defense Documentation Center (DDC).

In 1979, DDC's name was changed to DTIC to symbolize an expanded mission that includes providing direct information system and data base support to the Office of the Under Secretary of Defense for Research and Engineering (OUSDR&E) and to Principal Staff Assistants of the Office of the Secretary of Defense (OSD) in coordinating the overall Scientific and Technical Information Program (STIP).

II. OPERATIONAL AUTHORITY

DTIC is under the operational control of the Director, Defense Logistics Agency, and under the policy guidance of OUSDR&E. In 1962 Dr. John S. Foster, then Director of Defense Research & Engineering (DDR&E) (OSD), established the position of Director of Technical Information which was the focal point for detailed policy guidance to what was then DDC. This position is known today as the Director of Research and Technical Information in OUSDR&E.

On October 2, 1981, a DoD Directive on the subject of STIP was signed into effect (DoDD 5100.36).⁶ This directive prescribes composition and policy of the STIP; defines a program for carrying out OSD's responsibility for the STI function; and outlines DTIC's mission, responsibilities, and functions.

DTIC FUNCTIONS

- O Centralised DoD Document Services
- O Centralized DoD Data Base Services
- O DoD Information Analysis Center Support
- O DoD Technical Library Support
- O Application of Advanced Information Science and Technology
- O Related STI Support Services

DoD directives⁷⁻¹¹ require that each R&D project and work effort be documented in a standardized format including relevant information such as objective, approach, and conclusion.

DOD DIRECTIVES/INSTRUCTIONS

- O DoD Directive 5100.36, Defense Scientific and Technical Information Program
- O DoD Instruction 7720.13, Research and Technology Work Unit Information System
- O DoD Instruction 7720.16, Research and Development Planning Summary (DD Form 1634) for Research and Development Program Planning Review
- O DoD Instruction 5100.66, Establishment of Policy for, and Administration of, Independent Research and Development Programs (IR&D)

III. INFORMATION SERVICES PROVIDED

DTIC provides its registered users with a wide range of products and services from the following four major data bases it maintains for DoD.

DTIC'S MAJOR DATA BASES

- O R&D Program Planning (R&DPP)
- O R&T Work Unit Information System (R&T WUIS)
- O Independent Research and Development (IR&D)
- O Technical Reports (TR)

The R&DPP data base contains program planning management information at the project and task level.

SAMPLE R&DPP DATA ELEMENTS

Program Element/Project/Task Area Number
 Title
 Responsible DoD Organization (Name and Address)
 Responsible Individual
 Telephone Number
 Objective and Approach
 Plans
 Programs and Accomplishments

The Work Unit Information System data base is a collection of technically oriented summaries that describe research and technology projects currently in progress at the work unit level. Information includes the what, where, when, how, at what costs, by whom, and under what sponsorship research is being performed.

SAMPLE WUIS DATA ELEMENTS

Title
 Performing Organization
 Principal Investigator
 Descriptors
 Program Element/Project Number/Task Number
 Objective

Accession For	NTIS GRA&I	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	DTIC TAB	<input type="checkbox"/>	<input type="checkbox"/>
	Unannounced		
	Justification	506-AP-0130-887	
By	Distribution/		
Availability Codes			
Avail and/or			
Special			
Dist	A 20		



The IR&D data base contains descriptions of the technical programs being performed by DoD contractors that are not wholly funded by DoD but that are considered proprietary information and exempt from disclosure under the Freedom of Information Act.¹²

SAMPLE IR&D DATA ELEMENTS

Project Number/Title
Organization
Problem
Objective
Approach
Progress

The TR data base is a collection of bibliographic citations to formally documented scientific and technical results of Defense-sponsored research, development, test, and evaluation. These reports are assigned an AD (accessioned document) number for announcement, retrieval, and request purposes and are categorized by subject into a two-level arrangement consisting of 22 major subject fields and 188 related subject groups. DoD was instrumental in the COSATI development of field and group codes. These provide the basis for subject grouping of reports for announcement and distribution purposes.^{13, 14}

SAMPLE TR DATA ELEMENTS

Report Number
Title
Author
Performing Organization Name and Address
Distribution Statement
Key Words
Abstract

Figure 1 shows the number of records in DTIC's four data bases. Figure 2 shows input figures for these data bases for the past 6 fiscal years. Total input into the systems has increased by 17% during that period.

There are three basic ways to access these data bases.

PRODUCTS AND SERVICES

- O Demand
- O Automatic
- O Defense RDT&E On-Line System (DROLS)

DEMAND SERVICES

DTIC fills requests for technical reports in both paper copy and microform on demand. (See Figure 3, TR Hardcopy and TR Microform.) Demand bibliographies which list technical reports related to a specific subject are also conducted at the user's request. To prepare these bibs a computer search is made of the TR data base and reports that fit parameters of the search are listed with control numbers, abstracts, and other descriptive data. (See Figure 4, Custom Bibs.)*

Management information reports are similarly provided on demand but the search involves one or more of the three management data bases (WUIS, R&DPP, and IR&D). (See Figure 5, Custom Bibs.)*

Reference services include the assistance DTIC provides users and others in identifying documents and in locating a source for documents that DTIC does not have.

AUTOMATIC SERVICES

Registered DTIC users receive DTIC's TR announcement publication, the Technical Abstract Bulletin (TAB), automatically. Published every 2 weeks, TAB lists new classified and unclassified/limited scientific and technical reports accessioned by DTIC during the processing cycle. Reports are grouped into the subject fields and groups mentioned earlier. TAB is available in paper copy, in microfiche, or on magnetic tape. Because of the nature of defense programs and the reports these programs generate, distribution of TAB is limited.^{15, 16}

TAB Indexes are issued with TAB to assist in identifying accessions of particular interest. There are seven TAB Indexes arranged by the following: Corporate Author-Monitoring Agency, Subject, Title, Personal Author, Contract Number, Report Number, and * On Figures 4 and 5, "Remote Batch" reflects cases where users generate a bib on line but request that it be printed at DTIC and mailed to them. The "Direct Responses" category represents those instances in which the user's needs are satisfied completely by the printout generated on line at the user's site.

RECORDS IN DTIC DATA BASES AS OF 31 MARCH 82

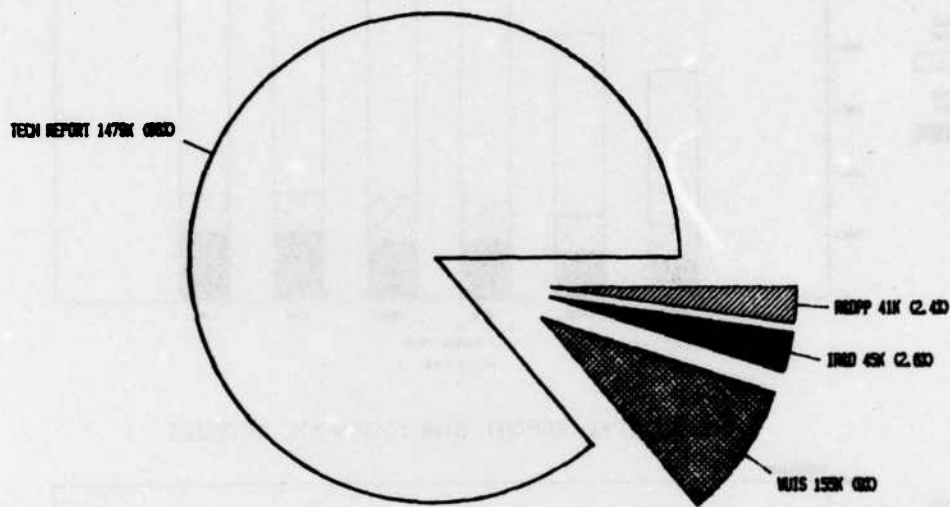


Fig. 1

INPUT TO DTIC DATA BASES

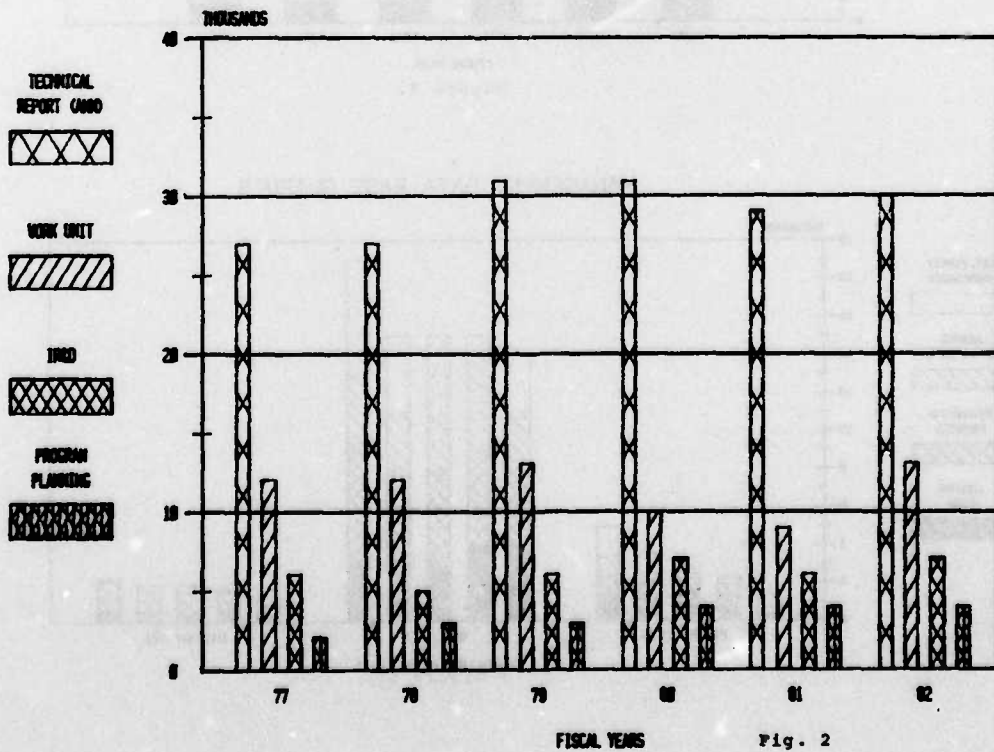


Fig. 2

TECHNICAL REPORTS DISTRIBUTED

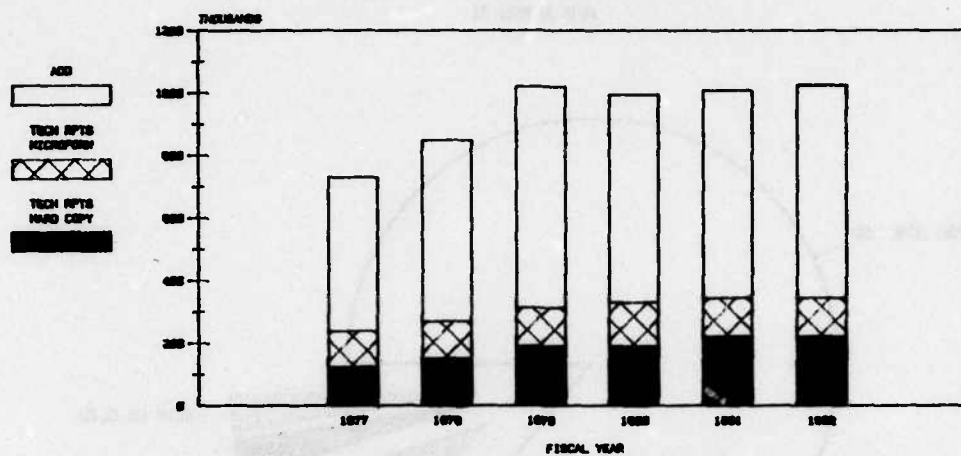


Figure 3.

TECHNICAL REPORT BIBLIOGRAPHIC OUTPUTS

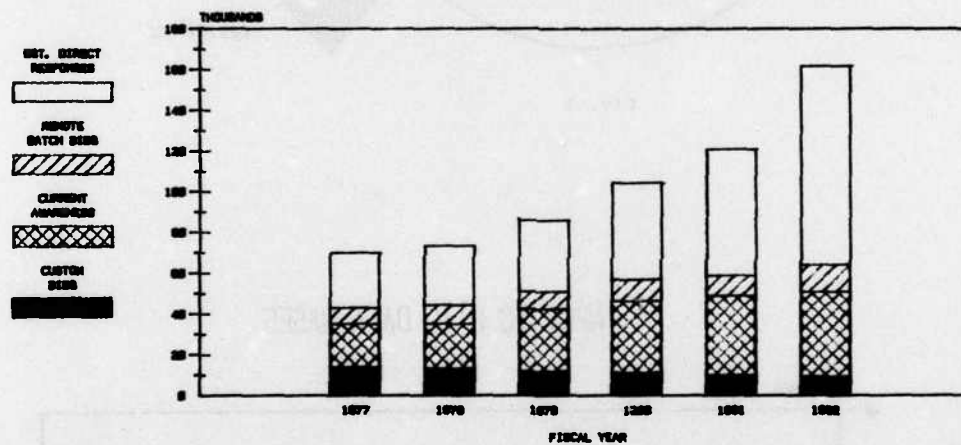
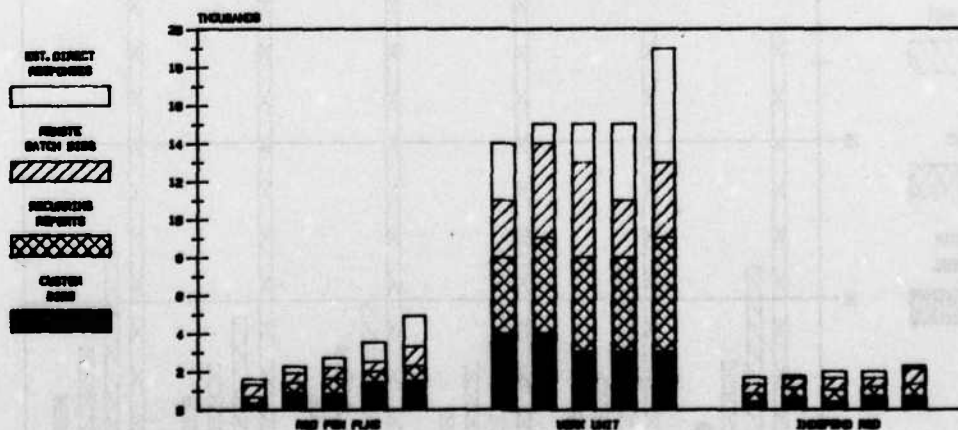


Figure 4.

MANAGEMENT DATA BASE OUTPUTS

FY1976-1982 BY DATA BASE
Figure 5.

Ralaasa Authority. Each raport entry liete the AD numbar and the subject field/group whara tha complata announcamant appears in TAB.

Evary 2 waaka the Automatic Document Dietribution (ADD) Program providas microfiche copias of nawly accessioned technical raporte to program participants by comparing a subject interest profile they have establisahd with racantly acquirad raports. (Sea Figura 3, ADD.) The charge per raport providad is ona-third the demand cost.

DTIC'a Current Awareness Bibliography (CAB) Program also usas a subject intarast profila to datarmine which documents accessionad during tha previous 2 waaka fall within tha scopa of a participant's recurring subject needa. A papar copy bibliography is ganerated automatically and sant fraa to DTIC registerad usars. Figura 4 shows the succass DTIC has had increassing thasa automatic, and lass costly to generata, products.

Recurring managament information system raports are compiled monthly, quartarly, semiannually, or annually from the Work Unit, Program Planning and Inependant Research and Developmant Data Bases. Formats for tha automatically issued, profila-based raports are designad by tha recipient organizations. Saarch profiles are kept on a maater fila which is updated monthly to make changes or modify the profiles for individual raports. Figure 5 shows the numbers of Recurring Raports generatad by data base for tha last 5 fiscal yaars.

DROLS

The DROLS network links ramota tarminals scattered from coast to coast to DTIC's cantral computer in Alaxandria, Virginia. Typically, tarminal sitas consist of a cathode ray tube (CRT) data entry and display unit and a paga printer. A magnatty tape cassatta system is also availabla for use with the tarminal. Usars quary tha eyetam by typing commands and appropriata data on a keyboard associated with the CRT. Usars may switch from one data basa to anothar in pursuit of information; thay may activate the paga printer to print out a paper copy of the CRT display, or they may racord information on a tape cassette syetam for later review and printing.

Remote terminals offer users immediate access to relevant information. They can order bibliographies, management data reports, and technical reports directly from thair terminals. Currant and proposad terminal stations include tha Deputy Under Secretary of Defensa Research and Engineering (Research and Advanced Technology); Army, Navy, and Air Force facilities; Information Analysis Cantars (IACs); other federal govarnmant organizations; DoD contractors; and ragional service facilities for ragistared DTIC usars in Los Angalas, California, Washington, D.C., and Boston, Massachusatts.

DROLS TERMINAL SITES

Army	100
Navy	48
Air Forca	40
DoD/DoD Aganciee	13
Foreign Govarnmanta	1
Information Analysis Cantars	10
DTIC In-housee	56
Other Government Agenciee	22
DoD Contractors	<u>226</u>
TOTAL	516

Originally, accase to DROLS wae via leasad, dadicatad linas only, for both classifed and unclassifiad tarminals. All tarminale wara raquirad to ba UNIVAC equipmant. Savaral yaars ago a "dial-up" capability becamo availabla for unclassifiad usars that permits the uoa of a variety of terminale to accase DROLS and to pay only for actual "hook-up" time. Figure 6 showe the dramatic increasa in DROLS usare that tha dial-up capability has permittad.

RDT&E ON-LINE SYSTEM GROWTH

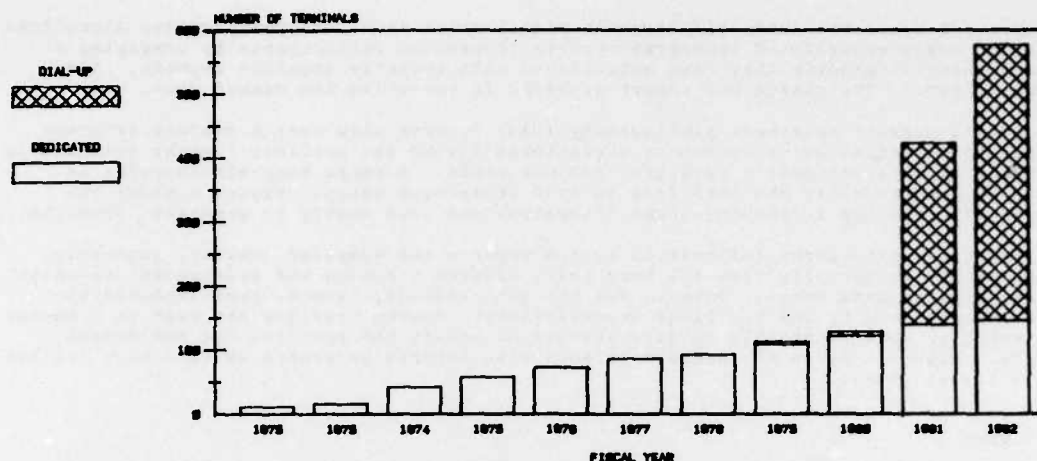


Fig. 6

IV. COMMUNITY OF USERS

Research and development activities within the United States government and their associated contractors, subcontractors, and grantees with current government contracts are eligible to receive most of the information from the DoD data bases located at DTIC. Research and development organizations without current contracts may become eligible for service under various potential contractors programs if sponsored by a military service. Certain collections at DTIC contain proprietary data or information compiled for the specific purpose of DoD management decisions which are made available to Defense components only.^{15, 16}

USER COMMUNITY

DoD AND DoD CONTRACTORS

OTHER GOVERNMENT AGENCIES

LIMITED SERVICE TO PUBLIC

About 2950 organizations are now registered for DTIC services. Most are in-house DoD or DoD contractors. Some are from other government agencies and their contractors.

REGISTRATION

Registration for DTIC's services involves the completion of two forms.

REGISTRATION FOR STI SERVICES SAMPLE DATA ELEMENTS

Part I - Requester Application	Organization Name
	Address
	Prime Contract/Grant or Program Number/
	Expiration Date
	Security Classification Required
Part II - Prime Contractor Approval (If Part I is a Subcontractor)	
	Organization Name
	Address
	Subcontract Number/Expiration Date
Part III - Certification and Approval	Organization Name
	Address
	Name/Title of Approving Official

In addition, contractors complete a facility clearance register.

FACILITY CLEARANCE REGISTER SAMPLE DATA ELEMENTS

Part I - Name of Facility
 For Contactor Address to Which Classified Material Will Be Forwarded.
 Name/Title of Requester

Part II - Verification That Facility Listed in Part I Is Cleared To Receive
 For Cognizant and Store DoD Classified Material Up To and Including
 Security Office (Classification)

 Name of Cognizant Security Office
 Address
 Name/Title/Signature of Certifying Official

REFERENCE/PUBLIC SERVICES

Each year DTIC responds to a large number of letters from individuals from industrial, research, educational, and state and local government organizations asking for information concerning the availability of technical reports to the general public. Searches of the DTIC collections and other sources are performed; the requester is advised if the particular reports are available, and how and from whom copies may be obtained.

When a DoD-sponsored report is not available to the public, DTIC forwards a copy of the requested report with the original request to the military controlling office to determine if the distribution limitation can be waived. If DTIC receives authority for public release, the report is provided to the National Technical Information Service (NTIS), Department of Commerce. (Through a contractual agreement with DTIC, NTIS provides the public copies of DoD R&D reports that are unclassified/unlimited. More than half of DTIC's technical reports become available to the general public via this route.) If selective release to the individual requester is approved, the controlling office will furnish the document unless many requests for the same document are involved. If release is not approved, the military controlling office so notifies the requester. As time permits, DTIC refers requesters to other useful sources as well.

NTIS announces the Defense reports, along with reports generated by R&D activities of other government departments, in its publication, Government Reports Announcements and its Indexes, and offers the reports for public sale.

FOREIGN REQUESTERS

DTIC does not serve foreign requesters.¹⁰ Release may be arranged only through the foreign release organizations of the respective military services. DTIC does, however, provide assistance to requesters through correspondence and telephone contacts with foreign embassies.

When an inquiry is received from a foreign requester (government, industry, research or educational institution, or an individual), DTIC identifies the information or document requested and determines its availability and the source from which it may be obtained. Availability information is sent with the original inquiry to the appropriate embassy.

LEGAL QUESTIONS

In connection with litigation, government attorneys often contact DTIC to request information concerning announcements of specific reports to the general public and disposition of patent ownerships resulting from particular research projects sponsored or cosponsored by DoD. DTIC makes a search and provides applicable report numbers, computer printouts, and catalog cards containing bibliographic data. This service is subject to a charge based on personnel costs.

RELEASE CONTROLS

DoD Directive 5200.20, Distribution Statements on Technical Documents,¹⁰ provides that all technical documents generated by DoD programs and eligible for distribution outside DoD will be reviewed by the controlling DoD office to determine their availability. They are marked either as approved for public release (distribution unlimited) or as limited distribution. In the latter case, requests from the general public and foreign requests must be referred to the controlling DoD office. This has no connection with security classification.

V. SOURCES OF INFORMATION COLLECTED

Primary contributors are individuals and organizations within DoD and under contract to DoD. Other contributors are NATO member countries and certain U.S. Government agencies that have special agreements with DoD.

Defense laboratories and their contractors are required to deposit information (both unclassified and classified, including secret and restricted data) into DTIC's data bases for subsequent retrieval by eligible users.

R&D Planning Summaries (DD Forms 1634) are submitted annually and reflect the current situation on the date of preparation.⁷ An R&D Planning Summary must be submitted for any new project included in the project listings supporting each budget submission. Revisions or changes are required only where a change in funding has had a significant impact on the technical content of the project or task area.

Data elements concerning research and technology efforts at the work unit level are reported on DD Forms 1498 (R&T Work Unit Summary) either on magnetic tape, on punched cards, or on the paper forms themselves.⁸ Work unit data is submitted to DTIC within 15 working days after the local action which it reflects has occurred within performing organizations.

Legible paper copies of technical reports are required to be forwarded to DTIC on completion of specific phases of all projects. For example, reports may be prepared quarterly, annually, or when all research has been completed, in which case copies are forwarded to DTIC no later than at the time of primary distribution.⁶

DTIC uses source-prepared summaries (DD Forms 1473 - Report Documentation Page) as the basis for its processing, announcing, and cross-referencing to the work unit and program planning data banks.

VI. EFFORTS UNDER WAY TO IMPROVE SERVICES

DoD IAC SUPPORT

As part of its expanded role in DoD's science and technology program, DTIC has been assigned as the program manager for nine DoD contractor-operated Information Analysis Centers (IACs). (There are 10 other DoD-sponsored IACs.) This includes providing necessary support and services related to improved coordination, planning, and integration of DoD-funded IACs and effecting and supporting a comprehensive program to improve IAC visibility, effectiveness, and use of the IACs in support of DoD and federal scientific and technical programs. It also involves developing and providing systems and services to assist or supplement IAC operations or programs to effect and promote resource sharing, joint approaches to common objectives and problems, and information exchange among the IACs, DTIC, and other components of the STIP.

Information Analysis Centers (IACs) are authoritative focal points of expertise in the field of S&T in which a particular center operates. As such, their contributions to DoD and its contractors in solving technological problems and in planning advanced defense systems are substantial.

SAMPLE IAC FIELDS OF SPECIALIZATION

- Reliability Analysis
- Chemical Propulsion
- Infrared Physics
- Nondestructive Testing
- Tactical Weapons Guidance and Control
- Metal Matrix Composites
- Metals and Ceramics
- Thermophysical and Electronic Properties

An IAC conference organized by DTIC in December of 1981 provided an excellent forum for reviewing and analyzing the IAC program. Management and operations of IACs were explored and recommendations were made to ensure a dynamic, integrated information system.¹⁷

PRODUCTIVITY TRENDS/DEVELOPMENT EFFORTS

DTIC has always prided itself on maintaining an impressive productivity record. Figure 7 measures productivity in its most basic form, total accomplishments by total resources. Workloads shown are those being measured by DLA's Performance Evaluation Reporting System (PERS), and total obligational authority is measured in constant FY 73 dollars. While DTIC's workloads for the past 9 years have increased by 60 percent, funds available have been reduced by almost 30 percent in real terms.

DTIC TOTAL OBLIGATIONAL AUTHORITY

IN CONSTANT FY 78 DOLLARS

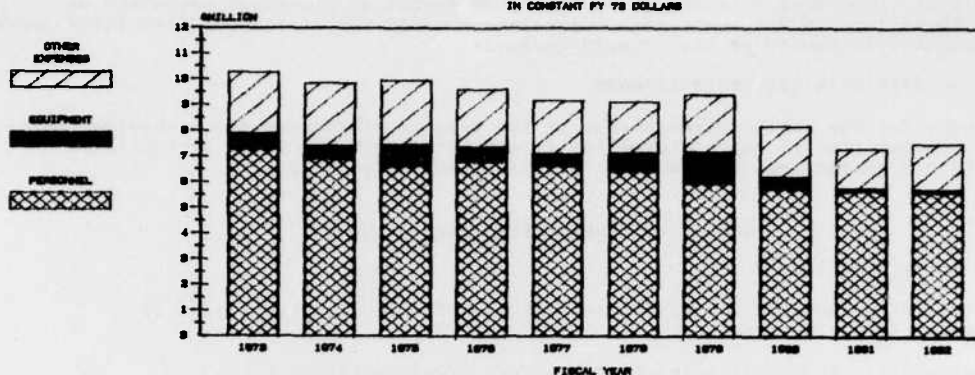


Fig. 7

Future plans call for DTIC to function as a DoD technical information development laboratory and to provide technical and management information support to R&D managers in the office of the Deputy Under Secretary of Defense, Research and Engineering.

MAJOR DEVELOPMENT PROJECTS

- O Free Text Experiment
- O Experimental DoD R&D Management Support Facility (DTIC ADPE Time Sharing Service)
- O Expanded Retrieval Training Program for DROLS
- O Data Base of Data Bases
- O Multimedia Input Project

Free text searching has been used successfully by others and could provide more comprehensive search results at DTIC. It has been implemented in all three of our management data bases. The concept involves placing single terms or words extracted from the title and abstract portions of the data bases in the inverted file for retrieval purposes. We've recently begun free-text searching for the unclassified title in the TR data base. This is expected to improve the effectiveness and efficiency of the acquisitions, cataloging, and reference functions in DTIC. If the title search capability proves successful, future plans include expanding the free-text capability to include the abstract portion of the record.

We are continually adding data bases to DTIC's ADPE Time Sharing Service (DTSS). This service uses a UNIVAC 1108 computer, standard UNIVAC software, and proprietary software packages including a data management system developed by Battelle-Columbus Laboratories. Users of the service communicate by direct dial-up or by using a time-shared communications network.

DTSS provides a rapid means for DTIC to develop and support new unclassified information systems for DoD. In addition, it permits us to experiment with and develop scientific and technical information systems and services as well as internal support for DTIC operations.

Data bases either established or being developed on DTSS include: a Manpower and Training Research Information System (a data base to track research efforts in manpower and training), a tri-service manufacturing technology data base, the Research Case Assignment and Litigation Locator legal data base, a serials data base for DTIC's internal reference library, and a DoD Conferences and Symposia Data Base.

Given the prominent place DROLS occupies in DTIC's service spectrum, and given the significant increases in its users made possible through the unclassified dial-up capability, efforts are under way to develop supplemental DROLS training. The approach will likely be modular to accommodate both dedicated and dial-up sites, and it will be configured so as to be cost effective and to provide self-instruction training for instructors and data base users in the field.

Presently, DTIC is defining data elements to constitute a single, centralized, comprehensive record of both bibliographic and non-bibliographic scientific and technical data bases sponsored by DoD. This data base of data bases will provide a single-source reference point and will be made available through a paperbound directory and an interactive information storage and retrieval computer system updated annually.

To facilitate DTIC's obtaining R&D information, we have experiments under way that may permit us to be more flexible in the form and format of technical documents we accept. Three input media to be tested are camera-ready document copy, microfiche input, and combination documents of hard copy/microfiche.

SHARED BIBLIOGRAPHIC INPUT NETWORK

Support for the early dissemination of the results of science and technology efforts and the incorporation of this information into DTIC's system is being accomplished through DTIC's operational Shared Bibliographic Input Network (SBIN).

GOALS OF SHARED BIBLIOGRAPHIC INPUT

DoD On-line Catalog

Central Clearinghouse of Availability Information and/or Acquisition of Defense-sponsored Documents

Printouts of Individual Holdings of Libraries/Information Centers

Support for Local Storage of Restricted-Access Material Using the Same System

SBIN permits participants to input bibliographic records directly from their remote terminals at libraries and information centers. DTIC provides the centralized computer capability and shares with the remote sites the input of information to create an on-line Defense catalog and referral service.

VII. EXTERNAL ARRANGEMENTS

As a "closed system" for DoD, DTIC does not have the authority to enter into external arrangements.^{18, 19}

One aspect of the DTIC mission, however, involves the primary distribution to designated recipients within the United States of technical reports obtained from the United Kingdom, Canada, and Australia, or from any other countries with whom similar bilateral agreements for routine exchange of R&D reports may be executed in the future.

Reports thus transmitted to DTIC for primary distribution are also processed into our system for subsequent secondary distribution to qualified DTIC users. Prior to making either primary or secondary distribution of classified reports, DTIC ascertains that the recipient's facility clearance is established at the necessary level.

PART B

NASA SCIENTIFIC AND TECHNICAL INFORMATION PROGRAM

HISTORICAL DEVELOPMENT

The National Aeronautics and Space Administration (NASA) was created by an act of the U.S. Congress in 1958 following a national debate which centered on the desirability of concentrating the American efforts in space in one agency. The successful Russian launching of Sputnik, the world's first artificial earth satellite, in October 1957, provided further impetus to this debate.

On October 1, 1958, NASA was established by the National Aeronautics and Space Act of 1958 as the successor to the National Advisory Committee for Aeronautics (NACA), which since 1915 had provided fundamental contributions to the progress of aeronautical science in the United States. Under terms of the Space Act, the property, facilities, and personnel of NACA were absorbed in the establishment of the new National Aeronautics and Space Administration.

In addition to the four national aeronautical facilities and 8,000 employees provided by NACA, NASA absorbed within a year the Jet Propulsion Laboratory and its assets, the Project Vanguard personnel from the U.S. Naval Research Laboratory, and the Development Operations Division of the Army Ballistics Missile Agency, which was headed by the world-renowned rocket engineer, Wernher von Braun. Other important organization centers were later created from the nucleus of transferred elements or by the acts of the U.S. Congress.

ESTABLISHMENT OF THE TECHNICAL INFORMATION PROGRAM

The new NASA organization continued to use the established NACA technical information processing system which had been designed for internal NACA use. This system was composed of a card catalog collection of 1,800,000 cards, three index-announcement publications, and a collection of NACA and other technical reports. The index-announcement publications were the Technical Publications Announcements (TPA) which listed NACA, British and AGARD documents but contained no indexes, an "Accession List" for distribution to the internal NACA family, which included the non-NACA documents that had been acquired and indexed for the NACA system, and finally, the "Index to NACA Technical Publications" which was issued on an annual basis. Catalog cards were prepared from the "Accession List" and distributed to the NACA centers. The Index was arranged according to a NACA classification scheme and contained a personal author index.

For two years NASA continued to use the information system begun by NACA. However, with the rapid expansion of the space program that was occurring at that time, the limitations of the NACA system as a way to handle the expected volume of information in a timely manner soon became apparent. Whereas NACA had done most of its research work in its own laboratories and employed virtually no outside contractors, NASA, while continuing to utilize its own laboratories, anticipated the employment of as many as 400 prime contractors and 10,000 subcontractors. The reports to be produced under these advanced research contracts would severely overload the NACA system.

In May 1960, the first large step to create a comprehensive scientific and technical information program in NASA to accomplish what the Space Act of 1958 required, namely, that NASA "provide for the widest practicable and appropriate dissemination of information concerning its activities and results thereof" was made. An Office of Technical Information and Education Programs was established. Melvin S. Dey, Director of technical information at the former Atomic Energy Commission, was hired as Deputy Director of that office. In 1962 Dey was named as the Director of the newly organized Office of Scientific and Technical Information. The NASA STI Program developed five operating "principles" which applied to this program then and continue, in updated form, to apply today:

1. Local access for the ultimate consumer;
2. Centralization only when necessary;
3. Timeliness;
4. Cooperation and collaboration with existing information systems;
5. Variety of products and services for a variety of user publics.

1. Under the first principle, local access for the ultimate consumer, the NASA Scientific and Technical Information (STI) Program tries to provide the scientist, the engineer, the laboratory worker, etc., with whatever information products, tools, and services he needs locally to do his job. He should not have to call a Washington or other remote office for help except in unusual cases. Technical reports, literature announcements and abstract journals, microfiche of documents recently acquired, access by local terminals to the NASA data base, and selective document announcement services are examples of local services and tools.

2. Centralization only when necessary, the second principle is a corollary of the first. It emphasizes the least centralization in the information program that is practical, using central processing only as it is demanded for efficiency, economy, or speed. Examples of centralized activities are acquisition, evaluation, duplicate checking, abstracting, cataloging, indexing, and microfilming. Such work is performed at a central location under NASA Headquarters, at the NASA Scientific and Technical Information Facility. NASA field installations and research centers are spared these tasks. One central computer services the information retrieval needs of all NASA installations by permitting local access to the NASA data base via the NASA/RECON system. The hours of computer operation at the NASA Facility are so arranged that they overlap the hour of work at the various NASA Centers located in four different time zones.

3. Timeliness, the third principle, is essential. Since the establishment of the NASA Scientific and Technical Information Facility, there has been a requirement to process and announce all reports obtained within four to six weeks after their receipt. The microfiche of reports and papers announced in the abstract

journals, Scientific and Technical Aerospace Reports (STAR) or International Aerospace Abstracts (IAA) are scheduled for delivery to the NASA Centers one week before the delivery of these journals. Literature searches requested from the NASA Facility are produced overnight and mailed within 48 hours. RECON commands from field-located terminals are answered in two or three seconds. Timeliness gets new information into hands of the people who need it without delay so as to eliminate any undesirable duplication and to incorporate as quickly as possible the thinking and results of others in their own or related fields.

4. The fourth principle, cooperation and collaboration with existing information systems, is of critical importance to the program's cost. NASA works closely with STI programs in other U.S. Government Agencies such as the Defense Technical Information Center of the Department of Defense, the Technical Information Service of the Department of Energy, and the National Technical Information Service of the Department of Commerce. NASA was among the first to provide and receive bibliographic information on magnetic tape to eliminate needless duplication.

NASA also works closely with specialized professional information organizations. Thus grew the division of labor between NASA and the American Institute of Aeronautics and Astronautics (AIAA). Beginning in January 1963, with NASA contract support, AIAA has provided in its International Aerospace Abstracts (IAA) coverage in depth of the world's published literature while the NASA program has concentrated in the Scientific and Technical Aerospace Reports (STAR) on similar coverage of the world's report literature. Both the NASA and AIAA journals utilize the same indexing system. Citations to each journal are available on the main NASA data base. Publication of IAA on alternating semimonthly schedule with STAR and other arrangements have been made. A unique feature of both journals for the early period was the inclusion of indexes in each issue and the timely, i.e., quarterly, cumulations of the indexes. The use of computer was instrumental in producing these timely indexes and later, through its on-line remote searching capability, allowed the quarterly cumulative indexes to become simply annual indexes.

5. The last principle promotes a variety of tools and services to suit a variety of user publics. Plainly no one tool, no one product, no one service can possibly satisfy the information needs of all users who are composed of librarians, information scientists, physical and biological scientists, engineers in a variety of disciplines, managers, and university researchers, all in various kinds of governmental, contractor and subcontractor organizations.

THE NASA SCIENTIFIC AND TECHNICAL INFORMATION FACILITY

While the principle of decentralization is and has been an integral part of the NASA information program, it was also realized that there are numerous functions that can be performed most efficiently and economically in a central location. These functions included the acquisition and processing of the world's aerospace report literature. In 1961 NASA management decided to establish the NASA Scientific and Technical Information Facility (STIF) in the Washington metropolitan area. To operate the Facility, it was also decided to contract with an information-system organization experienced in the abstracting and indexing of scientific documents and utilization of advanced information techniques and machines. The advantage of contracting as opposed to setting up an in-house operation was that it accelerated the process of establishing the NASA Facility by getting the immediate services of specialists, working quarters, and standing equipment and machines and bypassing the delays which would ensue in justifying, recruiting, selecting, hiring, and training a large in-house staff. The burgeoning growth of the American space program in 1960-1961 created an avalanche of technical information which proved impossible to control under the old system adopted from the NACA days but which required an immediate solution. It should be noted that the decision to operate an information facility on a contract basis was a major departure from the then current practices of other U.S. Government agencies.

In December 1961, Documentation, Inc., a Bethesda, Maryland, firm was selected competitively as the first contractor to operate the NASA information facility. The NASA Scientific and Technical Information Facility itself was established in January 1962 and became operational in July 1962 on the premises of the contractor. By 1966 the space occupied by NASA STIF had become inadequate and so larger quarters were secured and leased in College Park, Maryland. Documentation, Inc. (Doc. Inc.) and Leasco Inc. continued as the contractor-operator until 1968 when NASA conducted another competition and selected Informatics, Inc. as its contractor.

In 1975 the NASA STIF was relocated to its present site in Linthicum Heights, Maryland, near the Baltimore-Washington International Airport. Since 1980, the contractor of that facility has been the Planning Research Corporation's Government Information Systems Company, McLean, Virginia. It employs approximately 180 people including professional searchers, technical information specialists, librarians, computer experts, and various machine operators.

While operations at the NASA Scientific and Technical Information Facility are carried out by contractor personnel, policy and close technical guidance are provided by NASA's Scientific and Technical Information Branch (STIB). This Branch has its own specialists responsible for the major functional areas of the NASA STIF, who are in daily contact with the Facility managers to ensure smooth operations, solve emerging problems, and plan for future improvements. STIB's staff currently numbers 24.

OPERATIONAL AUTHORITY

In the National Aeronautics and Space Act of 1958, the U.S. Congress mandated in Section 203 of that Act:

The Administration, (i.e., NASA) in order to carry out the purposes of this Act, shall --

1. plan, direct, and conduct aeronautical and space activities;
2. arrange for participation by the scientific community in planning scientific measurements

- and observations to be made through use of aeronautical and space vehicles, and conduct or arrange for the conduct of such measurements and observations; and
3. provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof.

Thus Section 203 of the Space Act authorized the National Aeronautics and Space Administration in the field of scientific and technical information to establish and operate a NASA-wide program to ensure the fulfillment of information needs of all participants in NASA's research, development and technical programs, and to ensure ready access to NASA-generated scientific knowledge to non-NASA qualified users in the scientific, industrial, and educational communities.

NASA's Scientific and Technical Information Program goals provide for the design and development of an integrated, comprehensive system to ensure that NASA's work and its findings are reported both comprehensively and selectively; that all suitable information is provided to organizations and interests that can properly utilize it; that any of its scientific and technical information can be identified and made available in a meaningful form to specialized endeavors that in any way promote the national aeronautics and space programs; and that NASA programs receive full benefit of related technical information generated by the activities of others.

The program encompasses four principal work areas:

1. publications effort -- designed to provide both basic and supplementary interpretative publication of all information accruing directly from NASA's undertakings;
2. the acquisition and bibliographic control of all information resulting from, or necessary to support, the varied efforts in the aeronautical and space sciences, and the provision of NASA-wide reference services;
3. NASA participation in and support of scientific symposia and technical meetings; and
4. development activities in the field of scientific communication and documentation to promote the first three areas.

INFORMATION SERVICES AND PRODUCTS PROVIDED

Over the course of 20 years, the NASA scientific and technical information program has developed and refined information tools, products, and services which have proven beneficial.

1. STAR

Scientific and Technical Aerospace Reports (STAR) is the hallmark component of the comprehensive National Aeronautics and Space Administration information system covering aeronautics, space and supporting disciplines. STAR is the guide to thousands of current technical reports issued by organizations throughout the world. Twice a month it publishes abstracts and indexes of current reports acquired by NASA and processed for inclusion in the NASA scientific and technical data base. STAR announces the following types of publications:

- o NASA, NASA contractor, and NASA grantee reports;
- o Reports issued by other U.S. Government agencies, domestic and foreign institutions, universities, and private firms;
- o Translations in report form;
- o NASA-Owned patent and patent applications;
- o Dissertations and theses.

STAR publication began in 1963. Nearly 500,000 citations have been published in STAR to January 1982. New citations are being added at the rate of 24,000 per year. STAR provides five indexes: subject, personal author, corporate source, contract number, and report/accession number. It is issued to NASA Center libraries and to other organizations registered with NASA. Subscriptions to STAR and copies of individual issues and its index are publicly available from the U.S. Government Printing Office.

2. IAA

International Aerospace Abstracts (IAA) is a semi-monthly document announcement journal that provides abstracts and indexes of published documents in fields related to aerospace research and technology. NASA supports the preparation of IAA which has been a publication of the American Institute of Aeronautics and Astronautics (AIAA) since 1961. IAA lists journal articles, conference papers, books, and other forms of published literature that have been selected and processed by AIAA for incorporation into the NASA data base. IAA and STAR complement each other in the coverage of aerospace literature. As of January 1982, IAA had published approximately 666,000 citations of the published aerospace literature. At present about 37,000 citations are announced yearly. AIAA regularly scans hundreds of domestic and foreign journals known to be fertile sources of aerospace literature as well as publishers' lists and similar records of new publications. IAA essentially contains the same indexes that are in STAR. IAA and its cumulated index are available by subscription from the AIAA subscription office.

3. LSTAR

Limited Scientific and Technical Aerospace Reports (LSTAR) is a quarterly document announcement journal that provides abstracts and indexes of security-classified and limited-distribution documents acquired by the NASA Scientific and Technical Information Facility. Special authorization is required for access to the classified or limited-distribution documents found in LSTAR. Since 1972, about 4,000 citations have been announced in LSTAR which cites primarily reports of NASA-sponsored research and development. LSTAR includes five indexes: subject, personal author, corporate source, contract number, and report number. LSTAR is published in January, April, July, and October. To be eligible to request security-classified documents announced in LSTAR, requesters must have been certified:

- o To require access to security-classified information in the performance of official U.S. Government-sponsored work; and
- o To maintain adequate storage facilities for security-classified information and documents.

Citations in ISTAR do not contain classified information.

4. Technical Documents

Technical documents prepared by NASA, NASA contractor employees, and NASA grantees are collected by NASA's Scientific and Technical Information Branch (STIB) for issuance as NASA formal reports. NASA formal reports are assigned by the staff of NASA's Technical Publications Section to one of six series:

- o NASA Special Publications which record scientific and technical information from NASA programs, projects, and missions for presentation to readers of diverse technical backgrounds. NASA Special Publications often are concerned with subjects of substantial potential public interest.
- o NASA Reference Publications which are compilations of scientific and technical data and information deemed to be of continuing reference value in particular subject areas or disciplines.
- o NASA Technical Papers which record the findings of significant work conducted by NASA scientific and technical personnel. Technical Papers are the agency's counterpart to peer-reviewed journal articles and are subject to professional review controlled by the originating NASA office.
- o NASA Technical Memorandums which record scientific and technical findings that do not warrant or cannot be given broad dissemination because of security or restricted-readership consideration.
- o NASA Contractor Reports which record scientific and technical findings by NASA-sponsored research and development related efforts that are considered desirable for release by NASA.
- o NASA Conference Publications which contain compilations of scientific and technical papers, abstracts, or transcripts arising from conferences, symposia, special lecture series, seminars, and other professional meetings that NASA elects to publish.

5. SCAN

Selected Current Aerospace Notices (SCAN) is a semimonthly current awareness publication. It brings to the user's attention those documents, selected from STAR and IAA, that are relevant to the user's particular information interests. SCAN covers the full spectrum of aerospace information, but it subdivides that spectrum into narrower subject groupings than are provided by the category division of STAR and IAA. Approximately 200 separate SCAN topics are available to choose from: each one carefully tailored to fit the needs of specialized aerospace activities. The number and scope of SCAN topics are not fixed; new topics are added as the need arises and some are eliminated or redefined as user demand dictates. Semimonthly SCAN service is available to NASA employees, other U.S. Government agency personnel, contractors, grantees, and affiliated academic personnel.

6. Continuing Bibliographies

NASA publishes continuing bibliographies in certain fields. Each bibliography assembles recent citations on a single aerospace topic of wide interest, selected from STAR or IAA. The bibliographies currently being produced are:

Aeronautical Engineering (NASA SP-7037)
 Aerospace Medicine and Biology (NASA SP-7011)
 Earth Resources (NASA SP-7041)
 Energy (NASA SP-7043)
 Management (NASA SP-7500)
 NASA Patent Abstracts (NASA SP-7039)

7. Quarterly Listing of AGARD Reports

A listing of AGARD reports announced in STAR is prepared on a quarterly basis. Citations and abstracts in original format are contained in the listing. No indexes are included. The listing was published first in September 1967. This quarterly listing is available to AGARD panel members.

8. AGARD Index of Publications

The AGARD Index of Publications contains abstracts and indexes to AGARD documents published and distributed during the period covered. The first issue of the index covered the period 1952-1970, while subsequent issues have covered three-year periods.

9. NASA RECON

NASA RECON (Remote Console) is a computerized, online, interactive system for information research and retrieval. It enables users at remote locations to communicate directly with the host computer at the NASA Scientific and Technical Information Facility, containing the central scientific and technical information data base. RECON displays bibliographic information in ways that help to define user retrieval needs with maximum precision, guides the user to relevant documents through the use of Boolean logic, and permits simultaneous access for other users throughout the United States.

The RECON data base contains bibliographic information on well over 2,000,000 reports, journal articles, and miscellaneous documents of worldwide origin and of special interest to the aerospace community. The major document series accessible on RECON are:

- o Scientific and Technical Aerospace Reports (STAR)
- o International Aerospace Abstracts (IAA)
- o Limited Scientific and Technical Aerospace Reports (LSTAR)
- o Unannounced limited documents

- o NASA Research and Technology Objectives and Plans Summary (RTOPS)
- o NASA Research and Development Contract Search File
- o Computer Program Abstracts (CPA)
- o NASA Tech Briefs
- o NASA Library Collection

The RECON system enables the terminal user to display file indexes, choose desired index terms, combine sets of documents corresponding to these terms, display the resulting record, and print when desired. Response time is about 2 seconds and the system is capable of handling multiple collections of information, each with its own unique vocabulary data elements and descriptions.

10. Literature Search Service

For researchers who do not have access to the NASA data base locally through RECON, the NASA Scientific and Technical Information Facility provides individual literature searches on request to authorized users. In addition to the NASA data base, the STIF specialists provide NASA investigators with searches from a variety of other data bases.

11. Microfiche and Microcopy Service

Microfiche copies of documents announced in STAR are distributed automatically to NASA libraries. This distribution is performed semimonthly and ensures that microfiche of documents in a particular STAR issue is available locally before that STAR issue is published. This is a great help to librarians tasked to fill requests from patrons who spot an interesting report in the STAR issue.

The NASA Scientific and Technical Information Facility provides microfiche for all documents announced in STAR except those that are copyrighted and those that are barred from reproduction by unusual physical characteristics.

Microfiched documents are identified in NASA announcement journals and continuing bibliographies by a pound sign (#) following the accession number (for example N82-12345#).

The NASA Scientific and Technical Information Facility produces microfiche for about 18,000 documents a year. Approximately half of this number represents original or "master" sheets prepared by NASA STIF from hard copy and the other half represents prepared ("converted") sheets by NASA STIF from other microfiche. From these masters and converted fiche, NASA makes more than two million copies a year for automatic distribution to about 235 user organizations.

All microfiches produced by NASA STIF conform to the National Microfilm Association's Industrial Standard. They measure 105 mm by 148 mm and contain up to 98 pages at a reduction of 24X.

NASA microfiche is delivered to a central point, such as the library or information center, in each organization that has registered with the NASA Scientific and Technical Information Facility to receive document delivery service. The distribution of microfiche takes three forms:

- o Automatic distribution of all microfiche to organizations with broad information needs;
- o Selective distribution to organizations that have specified STAR categories as adequate to their needs; and
- o On-request distribution to NASA, foreign exchanges, and NASA Industrial Application Centers.

12. Translation Service

The NASA Scientific and Technical Information Program provides translation services to NASA scientists, engineers, administrators, and its other personnel on a request basis. Foreign language reports, books, journal articles, and official correspondence are translated regularly. Capability to translate from more than 30 foreign languages into English is available.

Before beginning the translation of a technical document, to prevent duplication, a search of the existing records of NASA and other U.S. Government agencies as well as published translation indexes is made. NASA RECON is a valuable tool in this regard. Telephonic and written inquiries are used with other U.S. Government agencies. The number of positive "hits" found during this searching is low: less than 2% of all requests are satisfied by translations completed or in process. However, these searches pay for themselves over a period of time.

NASA contracts with small business firms which actually produce the translations. These firms maintain on-site translation capability for the following languages: Russian, German, French, Italian, Spanish, Japanese, Dutch, Czech, and Portuguese. They also have affiliation with free lancees in more than 20 languages.

All NASA field centers order their translation services from the same firms. This unique provision was covered in the contract signed with each firm. Completed translation work is returned to the field center with a copy going to the manager of translation service at NASA Headquarters who provides quality control to the products and is the focus for any unique translation need, problem, or solution.

NASA translations are distributed in the NASA Technical Memorandum series and announced in STAR.

13. Journal Holdings for NASA Libraries

Comprehensive listings of all scientific and technical periodicals available in the NASA Headquarters Library and the libraries of all the field centers are combined in the Journal Holdings of NASA Libraries which is updated annually. A subject index classifies the alphabetically listed periodicals in 216 broad subject categories with extreme cross referencing. The Journal Holdings tells what periodicals are available, which libraries have them, and which issues of each title are held. Cross references indicate superseded

and superseding relationships between titles. Copies of Journal Holdings are available for reference at each NASA Center library.

14. Research and Technology Objectives and Plans Summary (RTOPS)

RTOPS is an annual guide to NASA-sponsored research in progress. It is a summary, with indexes, of all Research and Technology Objectives and Plans submitted by NASA Centers to NASA Headquarters for management review. A separate RTOP is prepared at the beginning of each fiscal year for every research project funded by NASA, which can be inhouse, through contract, grant, or interagency agreement. RTOP Summary is an annual publication which may be purchased from the National Technical Information Service. Citations for individual RTOPS are included in the computerized NASA data base.

15. NASA Research and Development Contract Search (R&DCS) File

The NASA R&DCS File contains information about NASA R&D contracts, grants, and orders issued since January 1, 1971. References to over 15,000 contracts are included in the file. The NASA R&DCS File is available to NASA personnel.

NASA USER COMMUNITY

One of the principles of the NASA information program has been that of local user services. The products and services produced at the central NASA Scientific and Technical Information Facility are distributed widely and mainly to local user points, such as libraries, information centers, or designated individuals acting as gatekeepers who, in turn, service the information needs of a large local population. Thus, the number of addresses receiving NASA products and services does not begin to reflect the actual number of users.

As of January 1982, within the NASA family of centers there were 432 addresses of local user points. A total of 194 firms, institutes, and universities were registered as NASA contractors. NASA products and services were provided to 229 addresses among government agencies and to 52 government contractors. There were 1,634 other domestic organizations, principally universities and public libraries, and individuals receiving one NASA product or another. Among those classified as foreign users, there were 366 organizations that had signed tripartite agreements, 225 organizations classified as bilateral exchange partners, one as a NASA contractor, and 78 foreign organizations which were not exchange partners but to whom NASA products were supplied, principally STAR and STAR Index. The total of all addresses which include organizations and individuals was 3,477 in January 1982.

SOURCES OF INFORMATION

The current sources of the information received into the NASA scientific and technical information system are shown in Table 1.

TABLE 1
SOURCES OF NASA ACCESSIONS (1981)

<u>Source</u>	<u>Accessions</u>	<u>Percentage</u>
NASA (including contractors)	15,459	24%
Dept. of Defense (including contractors)	12,062	18%
DOE, FAA, etc.	13,085	20%
Private Industry	161	-
Research/Academic Institutions	2,840	4%
Foreign Sources	5,374	8%
Library of Congress	16,452	25%
TOTAL	65,433	

This table indicates that NASA and its contractors and grantees in 1981 were responsible for providing 15,459 accessions or approximately 24%. The Department of Defense was responsible for 18%, and other U.S. Government departments and agencies responsible for 20%. The number of accessions emanating from private industrial sources, that is, sources not supported by government funds was 161. Research and academic institutions were the source for 2,840 accessioned documents, or 4%. Foreign sources were responsible for 5,374 accessions or 8%. Lastly, the Library of Congress provided 16,452 accessions or 25%. The book accessions taken from the Library of Congress MARC II are available to NASA librarians on NASA NALNET, the NASA Library Network.

TABLE 2
SOURCES OF INFORMATION ACCESSIONED IN
INTERNATIONAL AEROSPACE ABSTRACTS (1981)

	Journal Articles	Meeting Papers	Mono- graphs	Confarences Volumes	Collected Works	Total No. of Accessions
Australia	88			144		232
Austria	143					143
Belgium	16		2	1		19
Bulgaria	78					78
Canada	89		1	93		183
China Communist	169				28	197
China Nationalist	12					12
Czechoslovakia	125		1			126
Denmark	4					4
England	4,541	10	32	471	112	5,166
Estonia	3					3
Finland	3					3
France	667	47	38	64	1	817
East Germany	192					192
West Germany	1,394	126	38	295	8	1,861
Hungary	37		1			38
India	200		1	69		270
International Association for Hydraulic Research			1			1
International Association for Hydrological Sciences					1	1
International Astronautical Federation		430				430
International Atomic Energy Agency					1	1
International Council of the Aeronautical Sciences		1		11		12
International Society for Photogrammetry				279		279
International Solar Energy Society				2		2
International Union of Physiological Sciences		1				1
Ireland			1			1
Israel	29				22	51
Italy	224			15		239
Japan	596		1	287		884
Latvia	162		2			164
Mexico	7					7
Netherlands	1,380	4	19	307	62	1,772
NATO		4				4
Norway	4		1			5
Poland	254			40	2	296
Rumania	45					45
Saudi Arabia	2					2
South Africa	6					6
Spain	7					7
Sweden	59					59
Switzerland	275		2	79	2	358
USSR	4,526		287	38	555	5,406
Yugoslavia	1					1
Sub-total	15,338	623	428	2,195	794	19,378
United States	<u>9,539</u>	<u>1,978</u>	<u>112</u>	<u>5,042</u>	<u>316</u>	<u>16,987</u>
Sub-total	24,877	2,601	540	7,237	1,110	36,365
U.S. Translations of Soviet Periodicals	3,570					3,570
British Translations of Soviet Periodicals	<u>47</u>					<u>47</u>
TOTAL	28,494	2,601	540	7,237	1,110	39,982

Table 2 shows the country of origin of accessions received and processed in 1981 by the American Institute of Aeronautics and Astronautics into its abstract journal, International Aerospace Abstracts. Of the 39,982 accessions, approximately 48% or 19,378 accessions were from foreign sources and the balance from United States sources. However, if the U.S. and British produced translations were transferred to the foreign column then 58% of the accessions would be considered as foreign.

EFFORTS UNDERWAY TO IMPROVE SERVICES

Use of the RECON online retrieval system is being expanded to meet the requirements of a variety of organizations involved in NASA programs. This extension is made possible by a computer upgrade to the IBM 4341 class of processor units combined with new technology direct-access storage devices, specifically, the IBM 3380 disks. The new storage devices make it possible to greatly increase online storage of not only traditional bibliographic, project, and contract information, but also to store online new types of data. An example is descriptions of numerical data bases located at NASA Centers or contractor sites. Treating information of this class is a new direction for the NASA scientific and technical information program whereby modern methods of communications serve to permit switching of inquiries and electronic delivery of information. Indeed, new communications, photocomposition, and data-entry methods are expected to allow word-processing data-entry devices located at NASA Field Centers to tie directly by communications linkages into the central bibliographic data base. Thus, another cycle of decentralization would occur where optimum use is made of centralized capabilities. Following this evolutionary change, the same or similar techniques are expected to extend present data bases to include full-text data. Thus, full text can be expected to complement the numerical data bases previously noted.

Indexing of information for retrieval has traditionally been a specialty of information centers such as the NASA Scientific and Technical Information Facility. Cooperative effort based upon work done at the Defense Technical Information Center will lead to machine-aided indexing and more consistent application of the controlled vocabularies developed to meet NASA requirements. Following establishment of this partially automated approach to indexing, NASA planners expect to utilize similar online dictionaries and cross reference mechanisms to assist in the information retrieval process involving natural language and full text.

Another area of service improvement is NASA's continual modification of the scope of its bibliographic data bases to reflect new aerospace directions. For example, increased interest in NASA programs in large space structures results in new continuing bibliographies, and new approaches toward existing subject areas such as life sciences result in increased coverage. NASA has arranged with the Library of Congress and the American Institute of Aeronautics and Astronautics for expansion of the coverage of the field of life sciences in IAA. In 1982 the Library analysts will provide a total of 1,200 additional accessions in aerospace medicine, behavioral sciences, man/system technology and life support, and planetary biology. It is expected that most of these accessions will come from the Russian published literature.

THE NASA FOREIGN EXCHANGE PROGRAM

In general, NASA makes its scientific and technical information available only to foreign government organizations, research establishments, institutes of higher learning, and international organizations which have formally agreed to furnish NASA with documents pertinent to aeronautics or space and their related earth applications. Categories of documentation provided vary in each case, and a formal arrangement is tailored to the type, quality, and utility of the documents NASA receives in return.

NASA seeks from its formal exchange partners research reports, monographs, doctoral theses, bibliographies, and information other than formally published literature, which relate to the NASA mission and objectives. Contributions are continuously monitored and each formal arrangement is subjected to an annual evaluation. If the quality and quantity of documents contributed are much less than anticipated, NASA may modify the terms of the arrangement or terminate it completely.

A potential exchange candidate must provide specimens of its information products, a quantitative estimate of anticipated yearly contributions and specific indications as to which material NASA may copy or photograph on microfiche and make available to the U.S. public. The terms of a formal exchange arrangement are negotiated for NASA by its Scientific and Technical Information Branch in coordination with the NASA International Affairs Division.

Contributions from exchange partners are screened, evaluated, indexed in the NASA information system, and when appropriate, are announced and abstracted in STAR and IAA.

Foreign contributions accessioned in the information system are made available by NASA directly to its family of users and through the National Technical Information Service to the aerospace community and the public.

The primary products offered by NASA in its exchange are STAR and STAR Indexes. Exchange partners which supply both substantial and significant contributions are offered additional services such as automatic distribution of NASA formal series reports in selected subject categories and secondary request privileges.

NASA has formal bilateral exchange arrangements with 225 organizations in 49 countries. Some 2,574 documents were received from foreign exchange sources during 1981.

In addition, a special arrangement with the Information Retrieval Service of the European Space Agency (ESA) provides not only for reciprocal document exchange, but also for the exchange of special services. Under this arrangement, NASA provides its formal series reports and microfiche of other reports announced

in STAR and the computerized tapa index to thasa itams for ESA's on-line usa of tha NASA files in Europa. In turn, European users which hava completed a Tripartite Agraamant with NASA and ESA hava on-line access to tha NASA files maintained by ESA in Fraecatì, Italy, in exchange for at least ona, timaly, in-ecopa technical report for aach hour of on-line access time. As of May 1982, thara wera 366 Tripartite participante in 17 countries. ESA also supplias complete documant procassing, including microfiche masters, for the NASA information system on acquisitions from its Membar Statas and ealacted NASA exchanges and translation services on materalis ealacted by NASA.

OVERALL CONCLUSIONS

From NASA's inception in 1958, thara has axisted a broad commonality of intarests between the NASA aerospace technical information program and the dafansa technical information program. A vary ciosa dagraa of coordination and collaboration has been maintained in the acquisition of sciantific and tachnological raports affecting the national spaca and dafansa efforts, which have as thair primary goal the advancamant of sciantific frontiers and tha prevention of unnecessary duplication of rasearch and developmant.

The Dafansa Technical Information Centar's servicas and products ara availabla to and used extansivly by NASA installations, contractors, and grantaes. Department of Defansa installations, contractors, and grantaes can and do racaive similar sarvicae from the NASA Sciantific and Technical Information Facility. Examplas of reciprocal sarvices are tha dissemination of the abstract journals, preparation of litarature saarches, notification of on-going research, etc.

All possible staps have baen taken to permit tha utilization by either agency of the machina-readabla products of the othar; with machina output from ona being the direct machina input to the othar, duplicative procassing of common materials is minimized. Further, each contributes to the othar's development of basic cataloging rulas, standardization of microficha products, assistance in thesaurus development, axchange of computer tarminals to utiliza each othar's data base in litarature saarches and in other ways.

However compatible tha two information systems are, there ara diffarances which must remain. The dafansa information network is huge and supports a vast array of military and civilian installations. Classified information is a vital part of tha total information data basa maintained by DTIC. NASA STIF has small holdings of classified information; nearly all its information can ba raad in tha open literature or purchased from tha National Technical Information Sarvica. The classes of information held by DTIC exhibit much broader rangas of interests than tha NASA data base. NASA's association with tha American Institute of Aeronautics and Astronautics is unique, too. Foreign accessions in tha NASA data base ara much graatar than in the DTIC data base. Thus, each information system has contributions to make to tha othar and has dona so for a long tima and will continue to do so in the future.

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